PATENT **Docket No. RSW920000053US1**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTORS:	Bruce W. Moore and James R. Kramer	
APPLICATION NO.	09/685,838	
FILED:	October 10, 2000	Examiner: C. Graham
CASE NO.	RSW920000053US1	Group Art Unit: 3628

TITLE: SYSTEM AND METHOD OF SOLVING OPTIMIZATION PROBLEMS USING PRESTORED ADVANCE BASES

CERTIFICATE OF MAILING

I hereby certify that this paper is being deposited with the U.S. Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Commissioner for Patents, MAIL STOP APPEAL BRIEF-PATENTS, P.O. Box 1450, Alexandria, VA 22313-1450, Attention: Board of Patent Appeals and Interferences on March 8, 2006.

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Commissioner for Patents
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Attention: Board of Patent Appeals and Interferences

APPELLANTS' BRIEF

This brief is in furtherance of the Notice of Appeal filed in this case on December 6, 2005. A Petition extending the period for response for one month, to March 8, 2006, is enclosed, along with a Fee Transmittal Letter, regarding the payment of the Appeal and extension fees.

This brief is transmitted in triplicate. The requisite fee ($500.00) set forth in §1.17(f) is authorized to be charged to Deposit Account No. 09-0457. The extension fee is authorized to be charged to the credit card identified on the enclosed Form PTO 2038.

1. REAL PARTY IN INTEREST

The present application is assigned to International Business Machines Corporation, having its principal place of business at New Orchard Road, Armonk, NY 10504. Accordingly, International Business Machines Corporation is the real party in interest.

2. RELATED APPEALS AND INTERFERENCES

The appellant, assignee, and the legal representatives of both are unaware of any other appeal or interference which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

3. STATUS OF CLAIMS

A. Claims canceled: 1-33

B. Claims withdrawn from consideration but not canceled: None

C. Claims pending: 34-35

D. Claims allowed: none

E. Claims rejected: 34-35

F. Claims appealed: 34-35

Appealed claims 34-35 as currently pending are attached as the Claims Appendix hereto.

4. STATUS OF AMENDMENTS

A Reply under 37 CFR §1.111 was filed on August 5, 2004, and resulted in a non-final Action dated February 10, 2005. A Reply under 35 CFR §1.112 was filed on April 14, 2005, and resulted in a final Office Action dated July 5, 2005, appealed herein. A Reply under 37 CFR §1.116 was filed on October 4, 2005. A Notice of Appeal was filed on December 6, 2005.

5. SUMMARY OF THE CLAIMED SUBJECT MATTER

Claim 34: A computer-implemented method for solving a current financial portfolio optimization problem comprising the steps of: storing, on a computer, a plurality of data groups each associated with one of a plurality of anticipated financial portfolio optimization problems, each of the data groups including optimal solutions to a corresponding anticipated financial portfolio optimization problem, each of the data groups further including input values and intermediate calculation values associated with the corresponding anticipated financial portfolio optimization problem (*page 7, lines 1-12*); pre-solving, using said computer, the plurality of anticipated financial portfolio optimization problems (*page 7, lines 1-12*); compiling, using said computer, the plurality of data groups based on the results of the pre-solving step (*page 7, lines 1-12*); preparing and storing, on said computer, a plurality of look-up tables for identifying each of the plurality of data groups, the plurality of look-up tables containing equation names, RHS (Right Hand Side) values, and objective values pertaining to the plurality of anticipated financial portfolio optimization problems (*page 7, lines 13-15; page 9, line3-page 10, line 11*); solving, using said computer, the current

financial portfolio optimization problem using the stored data groups, the solving step including the steps of: selecting, using user-defined functions, at least one of the stored plurality of data groups using the look-up tables (*page 8, lines 6-10*); and determining whether or not the selected data group contains optimal solutions to the current financial portfolio optimization problem (*page 8, lines 12-23*); wherein, if the determining step determines that the selected data group contains optimal solutions to the current financial portfolio optimization problem, then the optimal solutions included in the selected data group are output as optimal solutions to the current financial portfolio optimization problem (*page 8, lines 24-26*); and wherein, if the determining step determines that the selected data group does not contain optimal solutions to the current financial portfolio optimization problem, then the selected data group is modified using a search method, and the current financial portfolio optimization problem is iteratively solved using the modified data group to obtain optimal solutions to the current problem (*page 8, lines 26-29*).

Claim 35: A system for solving a current financial portfolio optimization problem comprising: a storage unit, in a computer, storing a plurality of data groups each associated with one of a plurality of anticipated financial portfolio optimization problems, each of the data groups including optimal solutions to a corresponding anticipated financial portfolio optimization problem, each of the data groups further including input values and intermediate calculation values associated with the corresponding anticipated financial portfolio optimization problem (*page 7, lines 1-12 and Figure 1*); and an optimization unit in said computer, said

optimization comprising: means for pre-solving the plurality of anticipated financial portfolio optimization problems (*page 7, lines 7-12 and Figure 1*); means for compiling the plurality of data groups based on the results of the pre-solving (*page 7, lines 1-12 and Figure 1*); means for preparing and storing a plurality of look-up tables for identifying each of the plurality of data groups, the plurality of look-up tables containing equation names, RHS (Right Hand Side) values, and objective values pertaining to the plurality of anticipated financial portfolio optimization problems (*page 7, lines 13-15; page 9, line 3-page 10, line 11; and Figure 1*); means for solving the current financial portfolio optimization problem using the stored data groups, the solving means including: means for selecting, using user-defined functions, at least one of the stored plurality of data groups using the look-up tables (*page 8, lines 6-10 and Figure 1*); and means for determining whether or not the selected data group contains optimal solutions to the current financial portfolio optimization problem (*page 8, lines 12-23 and Figure 1*); wherein, if the determining means determines that the selected data group contains optimal solutions to the current financial portfolio optimization problem, then the optimal solutions included in the selected data group are output as optimal solutions to the current financial portfolio optimization problem (*page 8, lines 24-26 and Figure 1*); and wherein, if the determining means determines that the selected data group does not contain optimal solutions to the current financial portfolio optimization problem, then the selected data group is modified using a search method, and the current financial portfolio optimization problem is iteratively solved using the modified data group to obtain optimal solutions to the current problem (*page 8, lines 26-29 and Figure 1*).

The present invention allows different optimization problems to be solved with fewer iterations and improved response time. In a preferred embodiment, a predetermined number of anticipated financial portfolio optimization problems and calculations that are typically performed in solving them are pre-solved. Data associated with and derived from these calculations, e.g., anticipated input values, intermediate calculation values and optimal solutions to the anticipated problems, are stored in a database or the like. The prestored data in the database are used to reduce the processing time involved in obtaining optimal solution(s) to a current financial portfolio optimization problem to be solved.

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Applicant requests the Board to review the following rejections:

1. Rejection of claims 34-35 under 35 U.S.C. §103(a) based on U.S. Patent No. 5,822,747 to Graefe et al. in view of U.S. Patent No. 6,086,619 to Hausman.

7. ARGUMENT

A. The Cited Art Does Not Render the Claims Obvious

The Examiner has not Established a *prima facie* Case of Obviousness

As set forth in the MPEP:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skilled in the art, to modify the reference or to combined reference teachings. Second, there

must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP 2143

U.S. Patent No. 5,822,747 to Graefe et al. ("Graefe") teaches a system and method for optimizing a database query. The system consists of a search engine and a database implementor that determines an optimal plan for executing an SQL query. The SQL query is represented as a query tree consisting of a number of nested expressions. The search engine generates a number of plans from which an optimal plan is selected. Only after the optimal plan is selected are the optimization problems solved in Graefe et al. The Examiner first acknowledged that Graefe fails to teach storage of a plurality of data groups whereby the data groups include optimal solutions to corresponding anticipated optimization problems, and solving a current optimization problem using the stored data groups. However, the Examiner now contends that Graefe teaches these limitations. In the most recent Office Action, the Examiner acknowledges that Graefe fails to explicitly teach financial information optimization.

U.S. Patent No. 6,086,619 to Hausman ("Hausman") teaches an apparatus and method for modeling optimization problems providing variable specification of both input and output in enhanced graph theoretic form. Problem elements including nodes and links may be defined, as may constraints on nodes and links and on groups of nodes and links, including proportional and required relationships between network elements and groups of network elements that are connected and unconnected. Data received in enhanced graph theoretic format are transformed into the form of an objective function, possibly including linear, bilinear, and quadratic terms, and

a system of constraints, which are then solved using network program, linear program, or mixed integer linear program software.

The requirements of a *prima facie* case of obviousness have not been met. As the Examiner initially acknowledged, Graefe fails to teach the pre-solution of optimal solutions to anticipated portfolio optimization problems and storage of these pre-solutions, and then use of these stored pre-solutions in solving a current portfolio optimization problem. In now taking the position that Graefe does disclose these limitations, the Examiner points to Graefe's generation of a solution to a subproblem as evidence of these limitations (Graefe, col 2 lines 30-65). The text of Graefe, however, discloses a different set of steps, none of which involve the pre-solving of anticipated portfolio optimization problems. Graefe takes an input query already submitted by a user (Graefe col 6 lines 53-60). This input query is parsed into a query tree, which acts as an internal representation of the input query. It is this query tree which is "further partitioned into one or more subproblems" (Graefe col 11 lines 50-51). The subproblems in Graefe are merely portions of the original input query. As the input query is only solved after the user has submitted it, there is no anticipation of a portfolio optimization problem as asserted by the Examiner, nor is there any pre-solving of said anticipated portfolio optimization problem. Graefe simply partitions an input query into smaller subproblems for simultaneous solving, not for pre-solving of anticipated portfolio optimization problems.

Hausman is an apparatus and method for modeling linear and quadratic programs. Applicant does not deny that modeling of programs in this manner is well known; applicant does

not claim to have invented this technology. However, nothing in Hausman suggests or teaches pre-solving anticipated portfolio optimization problems and storing the results of these pre-calculations so that they may be later used to speed up the process of solving a current portfolio optimization problem when needed. Without any such teaching or suggestion, it is inappropriate to reject the claims based on Graefe or Hausman, either alone or in combination.

Both independent claims 34 and 35 herein include the limitations of storing the pre-solution of optimal solutions to anticipated financial portfolio optimization problems, and then use of these stored pre-solutions in solving a current financial portfolio optimization problem. Accordingly, for the reasons set forth above, the Board is respectfully requested to overrule the rejection of the claims under 35 U.S.C. §103.

Additionally, the Examiner states that Graefe fails to explicitly teach financial information optimization. The Examiner relies on Hausman to teach the use of a specific construct, QUADCOSTS, and a network optimization method, Netcore, to modify Graefe to include financial portfolio optimization. Hausman, however, is an apparatus and method for modeling network optimization problems where attention can be paid to nodes and links which may be problematic. The Examiner states that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Graefe to include financial [*sic*] taught by Hausman in order to perform optimization on a financial portfolio." No teaching or suggestion of applying the optimization techniques used by Hausman to database input queries is disclosed in Hausman. Nor does Graefe disclose that network optimization techniques can be applied to database input queries. Therefore, it is impossible to assert that it would have been

obvious to modify Graefe as taught by Hausman as neither provides motivation for such a combination of teachings.

Both independent claims 34 and 35 herein include the limitation of anticipating financial portfolio optimization problems. Accordingly, the Board is respectfully requested to overrule the rejection of the claims under 35 U.S.C. §103.

8. CONCLUSION

For the foregoing reasons applicants respectfully request this Board to overrule the Examiner's rejections and allow claims 34-35.

Respectfully submitted:

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Date

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CLAIMS APPENDIX

CLAIMS INVOLVED IN THIS APPEAL:

Claims 1-33 (Canceled)

34. (New) A computer-implemented method for solving a current financial portfolio optimization problem comprising the steps of:

storing, on a computer, a plurality of data groups each associated with one of a plurality of anticipated financial portfolio optimization problems, each of the data groups including optimal solutions to a corresponding anticipated financial portfolio optimization problem, each of the data groups further including input values and intermediate calculation values associated with the corresponding anticipated financial portfolio optimization problem;

pre-solving, using said computer, the plurality of anticipated financial portfolio optimization problems;

compiling, using said computer, the plurality of data groups based on the results of the pre-solving step;

preparing and storing, on said computer, a plurality of look-up tables for identifying each of the plurality of data groups, the plurality of look-up tables containing equation names, RHS (Right Hand Side) values, and objective values pertaining to the plurality of anticipated financial portfolio optimization problems;

solving, using said computer, the current financial portfolio optimization problem using the stored data groups, the solving step including the steps of:

selecting, using user-defined functions, at least one of the stored plurality of data groups using the look-up tables; and

determining whether or not the selected data group contains optimal solutions to the current financial portfolio optimization problem;

wherein, if the determining step determines that the selected data group contains optimal solutions to the current financial portfolio optimization problem, then the optimal solutions included in the selected data group are output as optimal solutions to the current financial portfolio optimization problem; and

wherein, if the determining step determines that the selected data group does not contain optimal solutions to the current financial portfolio optimization problem, then the selected data group is modified using a search method, and the current financial portfolio optimization problem is iteratively solved using the modified data group to obtain optimal solutions to the current problem.

35. (New) A system for solving a current financial portfolio optimization problem comprising:

a storage unit, in a computer, storing a plurality of data groups each associated with one of a plurality of anticipated financial portfolio optimization problems, each of the data groups including optimal solutions to a corresponding anticipated financial portfolio optimization problem, each of the data groups further including input values and intermediate

calculation values associated with the corresponding anticipated financial portfolio optimization problem; and

an optimization unit in said computer, said optimization comprising:

means for pre-solving the plurality of anticipated financial portfolio optimization problems;

means for compiling the plurality of data groups based on the results of the pre-solving;

means for preparing and storing a plurality of look-up tables for identifying each of the plurality of data groups, the plurality of look-up tables containing equation names, RHS (Right Hand Side) values, and objective values pertaining to the plurality of anticipated financial portfolio optimization problems;

means for solving the current financial portfolio optimization problem using the stored data groups, the solving means including:

means for selecting, using user-defined functions, at least one of the stored plurality of data groups using the look-up tables; and

means for determining whether or not the selected data group contains optimal solutions to the current financial portfolio optimization problem;

wherein, if the determining means determines that the selected data group contains optimal solutions to the current financial portfolio optimization problem, then the optimal solutions included in the selected data group are output as optimal solutions to the current financial portfolio optimization problem; and

wherein, if the determining means determines that the selected data group does not contain optimal solutions to the current financial portfolio optimization problem, then the selected data group is modified using a search method, and the current financial portfolio optimization problem is iteratively solved using the modified data group to obtain optimal solutions to the current problem.

EVIDENCE APPENDIX

No additional evidence presented.

RELATED PROCEEDINGS APPENDIX

No related proceedings are presented.